

# Hanford

## Overview


The Hanford Site, a 580-square-mile section of semi-arid desert in southeast Washington, was established in 1943 as part of the Manhattan Project to produce plutonium for national defense. Construction began in October 1943 on the first industrial-scale nuclear reactor, B Reactor, which produced plutonium for the Trinity test and one of the atomic bombs used to help end World War II. During a national security mission that lasted nearly five decades, nine nuclear reactors were built along the banks of the Columbia River to provide materials for five processing facilities that operated throughout the Cold War era. Hanford produced nearly two-thirds of the plutonium used in the U.S. nuclear weapons stockpile.

With the signing of the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) in 1989 by the DOE, the Washington State Department of Ecology, and the Environmental Protection Agency (EPA), the primary mission of the Hanford Site shifted from national security to environmental cleanup. Hanford's current mission focuses on preparing to treat millions of gallons of waste in large underground

tanks and reducing risks through remediation of contaminated areas, deactivation and decommissioning of facilities, groundwater treatment, and waste management (i.e., waste storage, treatment, and disposal).

Cleanup of the Hanford Site is managed by two DOE offices, the Richland Operations Office (DOE-RL) and the Office of River Protection (DOE-ORP). DOE executes the cleanup and risk-reduction efforts at the site through several prime contractors and their subcontractors. DOE-RL serves as the Hanford Site property owner and oversees cleanup along the Columbia River and in Hanford's Central Plateau, including groundwater and waste site cleanup, facility cleanout and deactivation and decommissioning, management of solid waste and nuclear materials, and all site support services.

Congress established DOE-ORP in 1998 as a field office to manage the retrieval, treatment, and disposal of approximately 56 million gallons of radioactive tank waste stored in 177 underground tanks in the Central Plateau. The tank waste is material left over from nearly 50 years of plutonium production. In support of this



For the seventh year in a row, the Department met its annual goal of treating more than 2 billion gallons of groundwater to remove contamination, in facilities like this one, in the 200 West Area of the Hanford Site.

mission, DOE-ORP is responsible for the safe operation of the tank farms and associated 200 Area facilities along with construction and operation of waste transfer systems and treatment facilities, including the Waste Treatment and Immobilization Plant (WTP) located in the Central Plateau.

EM leadership regularly engage a variety of stakeholders and consults with Tribal Nations regarding the cleanup vision for the Hanford Site. These include regional elected officials, business leaders, and advisory board members representing more than 30 individual interests and the public at large. Through engagement during development of the Strategic Vision, stakeholders and Tribal Nations identified several areas in which the Strategic Vision for Hanford could be strengthened, including identifying established dates for noted milestones and completion dates for planned work, as well as goals that could allow quantifiable assessment of results.

## Calendar Year 2021 Accomplishments

- Completed construction of all WTP facilities required to support the Direct Feed Low Activity Waste program
- Completed the Loss of Power Test at the WTP, the first major integrated plant test in the commissioning program
- Began tank waste treatment at Hanford through newly operational Tank-Side Cesium Removal (TSCR) System that removes radioactive cesium and solids from tank waste
- Completed retrieval of single-shell tanks AX-102 and AX-104
- Completed stabilization of below grade cribs/tanks at Hanford – an EM priority
- Initiated ground preparations for the installation of the steel enclosure for the K-East Reactor
- Treated more than 2 billion gallons of contaminated groundwater for the seventh consecutive year


## Planned Cleanup Scope 2022–2032

The coming decade will see the successful launch of one of EM's largest and most significant cleanup activities — the start of tank waste treatment at Hanford through the DFLAW program. This is a goal EM has been pursuing for more than two decades at Hanford and will address one of the largest environmental challenges in the EM complex.

## TANK WASTE TREATMENT

In 2022, DOE will progress DFLAW commissioning activities for the WTP LAW Facility, Balance of Facilities, and Analytical Laboratory. Through the DFLAW program, EM anticipates the commencement of low-activity tank waste treatment by the end of 2023. Transitioning these facilities to operational status will commence the treatment of the most mobile form of tank waste, beginning an important new phase of the Hanford Site cleanup effort.

The DFLAW program requires a pretreatment system known as the TSCR system. This system will pretreat tank waste supernate in preparation for waste feed delivery when the WTP LAW Facility is operational. In 2022, TSCR will be operated to achieve a goal



Following installation near the AP Tank Farm and rigorous testing, the TSCR is ready to start treating tank waste in 2022 to build up a large supply of liquids that can be fed directly to the nearby vitrification facility beginning in 2023.



of 1 million gallons of pretreated waste for DFLAW operations.

By the end of 2022, upgrades will also be completed at the Liquid Effluent Retention Facility (LERF) and Effluent Treatment Facility (ETF) to support the treatment of the anticipated secondary liquid effluent from DFLAW operations. Additionally, the Integrated Disposal Facility, where the vitrified low-level tank waste will be disposed, will be completed and ready for operations. EM will continue design activities at the WTP High-Level Waste facility to maintain progress towards treating the remaining Hanford tank waste in the mid-2030s.

## RISK REDUCTION

By the end of the decade, the 324 Building will be demolished following the remote excavation of the contaminated soil underneath the facility. Additionally, the 105-K West Fuel Storage Basin will be deactivated and demolished, allowing the K-East and K-West reactors to be placed in interim safe storage. Active groundwater remediation systems will continue operating along the Columbia River and on the Hanford Central Plateau, reducing the risk that contaminated groundwater will leave the site.

DOE will complete the transfer of cesium and strontium capsules, currently at the Waste Encapsulation and Storage Facility, to safer and stable dry storage at a nearby Capsule Storage Area that is currently under construction. Stabilization activities at the Reduction-Oxidation Plant (REDOX), the Plutonium Uranium Extraction Plant (PUREX), and B Plant will place these facilities in a low-risk and low-cost surveillance and maintenance (S&M) configuration. Several high-risk facilities involved in plutonium production at Hanford will be demolished, and waste site remediation efforts will continue throughout the Central Plateau with the waste disposed at the Environmental Restoration Disposal Facility. Finally, later in the decade, TRU waste shipments to WIPP are set to resume.

## Key Regulatory Milestones 2022–2032\*

Cleanup activities at Hanford are governed by the Tri-Party Agreement. Some cleanup activities are also governed by a 2010 Consent Decree between DOE and the State of Washington (as significantly amended by the court in 2016).

- **Complete LERF and ETF upgrades to support DFLAW hot commissioning – 2023**
- **Complete LAW Facility hot commissioning and begin production-scale tank waste disposition – 2023**
- **Complete interim safe stabilization for K East and K West Reactors – 2024**
- **Transfer cesium/strontium capsules to dry storage – 2025**
- **Complete soil remediation and 324 Building demolition – 2025**
- **Complete single-shell tank retrievals in A/AX Farms – 2026**
- **Remove all mixed waste containers currently located at the Central Waste Storage Complex from outside Storage Areas A and B – 2026**
- **Initiate certification activities by processing TRU container – 2028**
- **Complete remedial actions for contaminated soil beneath and disposition of the 324 Building – 2030**
- **Substantially complete construction of the WTP High-Level Waste Facility – 2030**
- **Start cold commissioning of the HLW Facility – 2032**

\* Some scheduled milestones have been revised due to COVID restrictions, necessary protocols, and the resulting inefficiencies. Other milestones may require revision due to the ongoing pandemic. DOE will continue to work with regulators to revise milestones, as needed.



## Post-2032 Cleanup Scope

Post-2032, cleanup activities at Hanford are expected to include continued tank waste retrieval and treatment, along with tank closure activities; construction of additional waste treatment facilities; transuranic waste treatment and shipment for disposal; and extensive facility demolition and waste site remediation activities. Most of the River Corridor and Outer Area remediation activities, including active groundwater treatment, will be nearly completed, allowing for a greater focus on the extensive waste sites and facilities surrounding the B Plant, PUREX, REDOX, U Plant, and T Plant processing canyons on the Central Plateau. The Hanford Site infrastructure will consistently be right-sized and reconfigured to support the focused efforts on the Central Plateau.



By the end of 2023, Hanford's vitrification plant will be immobilizing tank waste in glass in the Low-Activity Waste Facility (center, right), supported by the plant's Analytical Laboratory (center) and 14 support facilities (top). By the end of 2032, construction of the plant's High-Level Waste Facility (lower right) will be completed, and cold commissioning will be underway.